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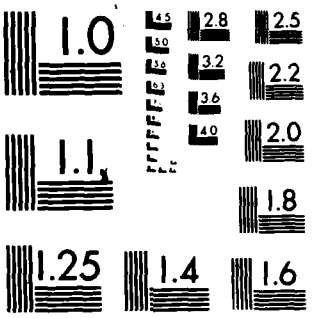

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VALIDATION OF THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY (ASVAB) SELECTION CRITERIA FOR STRATEGIC WEAPONS SYSTEMS ELECTRONICS "A" SCHOOL

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This predictive validation study was conducted to evaluate the effectiveness of the operational Armed Services Vocational Aptitude Battery (ASVAB) selector composite against Strategic Weapons Systems Electronics (SWSE) "A" School performance and to investigate the possible use of alternative ASVAB composites to reduce attrition in this school. Bivariate and multiple correlations between ASVAB predictors and three school

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performance criteria were computed and compared. The current ASVAB selector composite was found to be the best predictor of performance in SWSE "A" School. It was recommended that the selector composite be retained, but that careful consideration be given to the possibility of raising the cutting score(s).

FOREWORD

This research was conducted within work unit WRB2601 (Armed Services Vocational Aptitude Battery (ASVAB) Postenlistment Verification) and sponsored by the Chief of Naval Operations (OP-135). It was funded by the Enlisted Programs Implementation Office (OP-135) of the Chief of Naval Operations (MIPR N0002282 WR5900L) and was conducted in response to a request from the Naval Military Personnel Command to investigate using the ASVAB to reduce attrition in Strategic Weapons Systems Electronics "A" School.

Results are intended for use by Navy technical school personnel as well as by the research community. This investigation represents a small part of an ongoing effort to assure the optimal use of human resources in the Navy by validating selection and classification standards against performance measures.

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SUMMARY

Problem

Attrition at the Strategic Weapons Systems Electronics (SWSE) Class "A" School has increased substantially in recent years, exceeding 30 percent for personnel who attended the school in 1981. Concern over this high attrition rate led the Navy Personnel Research and Development Center to examine the effectiveness of the Armed Services Vocational Aptitude Battery (ASVAB) selector composite used to determine eligibility for school assignment.

Objective

The objectives of the research reported here were to (1) validate the operational ASVAB composite against SWSE "A" school performance and (2) identify and evaluate alternative ASVAB composites that may be more effective for determining qualification for school assignment.

Approach

Data analyses were performed separately for SWSE students with scores on ASVAB forms 5, 6, and 7 (N = 198) and 8, 9, and 10 (N = 300). SWSE "A" school attrition rates were computed and compared by ASVAB form and by class. Pearson product-moment correlations between ASVAB predictors and three school performance measures--final status (GRAD/DROP), final school grade (FSG), and days to graduate (DAYS)--were computed and corrected for restrictions in range. The validities of the Navy ASVAB composites in current use and the selected experimental composites were compared to the validities of the operational SWSE "A" school composite. Stepwise multiple correlations were also computed and comparisons made between multiple correlations and the uncorrected operational composite validities, using the five ASVAB tests that accounted for the most variance. For each version of ASVAB, the validities obtained for all three criteria were examined to identify a unit-weighted composite that would predict school performance more effectively than the operational selector composite. Expectancy tables were constructed for the operational selector composite for each version of ASVAB.

Results

1. Attrition rates were not affected by ASVAB form or by class.

2. For ASVAB 5, 6, and 7, the operational selector composite was found to be a fairly good predictor of the school performance criteria. For ASVAB 8, 9, and 10, the operational composite was found to be a good predictor of GRAD/DROP and of FSG but a poor predictor of DAYS. No composites were identified that were more valid than the operational composite for predicting the three criterion measures.

3. The optimal five-test multiple correlation was higher than the uncorrected validity of the operational composite for each of the three school performance criteria (the differences ranged from .04 to .26 correlation points).

4. Expectancy analyses indicated that the cutting scores used with the operational composite would need to be raised dramatically to lower attrition to acceptable (0-20%) levels.

Conclusions

1. The current ASVAB selector composite of SWSE "A" school (AR+MK+GS+EI) would be the most useful for selecting students.

2. Overall, the results of the validation and expectancy analyses indicate that the best way to lower SWSE school attrition would be to retain the current selector composite but raise the cutting scores. However, this method would reduce the number of eligible recruits, making the school quota more difficult to fill. The costs and benefits associated with each of the various cutting scores should be carefully considered before a decision is reached to change or retain the current cutting scores.

Recommendation

The operational selector composite should be retained by SWSE "A" school, but careful consideration should be given to the possibility of raising the composite cutting scores.

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INTRODUCTION

Background and Problem

The Strategic Weapon System Electronic (SWSE) Class "A" School (formerly Polaris Electronic "A" School) is a 19-week course designed to provide students with a basic knowledge of solid state electronics, electricity, inertial guidance theory, computer fundamentals, and digital logic principles. The course is theoretically rather than practically oriented, although laboratory sessions are included. The mode of instruction is lock-step during the first 14 weeks and self-paced during the last part of the course.

When the Armed Services Vocational Aptitude Battery (ASVAB) went into use in January 1976, the selector composite used to determine eligibility for SWSE "A" school consisted of the sum of four ASVAB tests with dual cutoff points: mathematical knowledge (MK) + electronics information (EI) = 163 + general science (GS) + arithmetic reasoning (AR) = 225. Subsequently, the operational school selector composite has been composed of these same four tests, but the cutoff scores have been changed twice: MK+EI+GS = 156+AR = 225 was used from September 1978 through 1980; and MK+EI+GS = 156+AR = 218 has been used since October 1980 to determine school qualification.

Attrition at SWSE Class "A" School has increased considerably in recent years. Whereas attrition was about 10 percent in 1975 and about 20 percent in 1976 and 1977, it exceeded 30 percent in 1981 and the first part of 1982. Because of concern over this increased attrition and the costs associated with it, the Navy Military Personnel Command requested that the Navy Personnel Research and Development Center examine the effectiveness of the ASVAB composite used for school selection.

Objectives

The objectives of the research reported here were to (1) validate the operational ASVAB composite against SWSE "A" school performance, and (2) identify and evaluate alternative ASVAB composites that may be more effective for determining qualification for school assignment.

APPROACH

Predictors

The primary predictor variables for this research were derived from the ASVAB. They included the scores on 12 ASVAB tests for forms 5, 6, 7 and on 10 tests for forms 8, 9, 10 (see Table 1), as well as the verbal (VE) score, obtained by summing scores on the word knowledge (WK) and paragraph comprehension (PC) tests. In addition, scores on sets of experimental composites and the selector composites currently being used by the Navy were used as predictors.

Criteria

Criteria of SWSE "A" school performance were:

1. Final status code (GRAD/DROP)--An indication whether a student graduated or dropped the course. Graduation was coded 1 and dropping 0.

Table 1

ASVAB Tests

Subtest	Abbreviation	Description
		Forms 5, 6, and 7
General information	GI	A 15-item knowledge test, primarily on sports, outdoor activities, automobile mechanics, and history--7 minutes.
Numerical operations	NO	A 50-item speeded mathematical test, requiring elementary addition, subtraction, multiplication, and division--3 minutes.
Attention to detail	AD	A 30-item speeded test in which the examinee counts the number of Cs embedded in lines of Os--5 minutes.
Word knowledge	WK	A 30-item vocabulary test--10 minutes.
Arithmetic reasoning	AR	A 20-item arithmetic test requiring examinees to solve word problems--20 minutes.
Space perception	SP	A 20-item pictorial test requiring examinees to select the three-dimensional figure that could be made from a flat pattern--12 minutes.
Mathematics knowledge	MK	A 20-item test requiring knowledge of algebra, geometry, fractions, decimals, and exponents--20 minutes.
Electronics information	EI	A 30-item test requiring knowledge of electrical and electronic components, principles, and symbols--15 minutes.
Mechanical comprehension	MC	A 20-item test about drawings illustrating mechanical principles--15 minutes.
General science	GS	A 20-item test measuring knowledge in the physical (N = 10) and biological (N = 10) sciences--8 minutes.
Shop information	SI	A 20-item test on shop tools and practices--8 minutes.
Automotive information	AI	A 20-item test on automobile parts, operations, or repairs--10 minutes.
		Forms 8, 9, and 10
General science	GS	A 25-item test of knowledge of physical (N = 13) and biological (N = 12) science--11 minutes.
Arithmetic reasoning	AR	A 30-item test of ability to solve arithmetic work problems--36 minutes.
Word knowledge	WK	A 35-item test of vocabulary, using words embedded in sentences and synonyms--11 minutes.
Paragraph comprehension	PC	A 15-item test of reading comprehension--13 minutes.
Numerical operations	NO	A 50-item speeded test of ability to add, subtract, multiply, and divide 1- and 2-digit numbers--3 minutes.
Coding speed	CS	An 84-item speeded test of ability to recognize numbers associated with words from a table--7 minutes.
Auto and shop information	AS	A 25-item test of knowledge of automobile, shop practices, and use of tools--11 minutes.
Mathematics knowledge	MK	A 25-item test of knowledge of algebra, geometry, fractions, decimals, and exponents--24 minutes.
Mechanical comprehension	MC	A 25-item test of knowledge of mechanical and physical principles--19 minutes.
Electronics information	EI	A 20-item test of knowledge of electronics, radio, and electrical principles and information--9 minutes.

Note. ASVAB test scores are reported as Navy Standard Scores having a mean of about 50 and a standard deviation of 10 for an unrestricted recruit population.

2. Final school grade (FSG)--The average of the student's scores on 23 tests.

3. Days to graduate (DAYS)--The amount of time spent in training (not including weekends) in the self-paced portion of the course, which requires approximately 25 days.

FSG and DAYS were not available for students who failed to complete the course.

Sample

The original sample consisted of 512 students enrolled in SWSE "A" school between May 1981 and August 1982: 200 who had been tested on ASVAB 5, 6, or 7; and 312, on ASVAB 8, 9, or 10. Data for 14 subjects who had been dropped from the course due to clearly nonacademic factors (e.g., medical problems and physical limitations), which ASVAB tests are not intended to predict, were deleted. Data for subjects dropped as a result of academic difficulties and attitude problems (which may have been related to academic difficulties) were retained. The resulting sample consisted of 498 students: 198 who had been tested on ASVAB 5, 6, or 7; and 300, on ASVAB 8, 9, or 10.

Data Analyses

Data analyses were performed separately for students with scores on ASVAB 5, 6, or 7 and those with scores on ASVAB 8, 9, or 10.

ASVAB Selector Validation

To gain some insight into the problem of SWSE "A" school attrition, attrition rates were computed and compared by class and by ASVAB form. Pearson product-moment correlations were computed among predictors (individual tests, composites in current use, and experimental composites) and the three criteria computed.[1] In addition, multiple correlations were calculated, using a standard stepwise regression procedure in which the order of inclusion of test predictors is determined by the contribution of each predictor to explained variance at each step. For each criterion, the five tests that explained the greatest amount of variance were selected. Zero-order correlations were corrected for restriction in range.[2] The population statistics used for the corrections were based on a group of 66,459 recruits who entered the Navy from July 1981 through May 1982.

The validities of the composites in current use and the experimental composites were compared to the operational composite validities. In addition, the multiple correlations and the uncorrected validities of the operational composite were compared, using the five ASVAB tests that accounted for the most variance. For both ASVAB versions, the validities obtained for all three criterion variables were examined to find a composite that would allow school performance to be predicted more effectively.

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[1]For the sake of simplicity, AR+MK+GS+EI was used as the operational composite in all analyses, as though it had a single cut-off point.

[2]Thorndike, R. L. Personnel selection. New York: Wiley, 1949.

Supplementary Analyses

In addition to the primary analyses described above, two supplementary analyses were conducted.

1. Pearson product-moment correlations between scores on the six class-administered achievement tests and the three criteria were computed and corrected for range restriction to determine the validity of the achievement tests for predicting school performance.

2. Correlations between ASVAB predictors (tests and selector composites) and scores on the six achievement tests were computed and corrected for restriction in range to determine whether the achievement test scores could be largely predicted from ASVAB scores, thereby eliminating the need for the achievement tests.

RESULTS AND DISCUSSION

Table 2, which provides graduation and drop (attrition) rates by ASVAB form and "A" school class, shows that the mean attrition rates for the two samples were identical--32 percent. While attrition by class showed an increase over time, no other significant patterns were found.

ASVAB Selector Validation

ASVAB 5, 6, and 7

Table 3 presents uncorrected and corrected validities of ASVAB 5, 6, and 7 tests and selector composites for predicting GRAD/DROP, FSG, and DAYS. As shown, the operational composite was moderately predictive of the three school performance criteria: The corrected validities were .51, .77, and -.48 for GRAD/DROP, FSG, and DAYS respectively. (A negative correlation is expected for the DAYS criterion, since a shorter time is expected for more able students.) Although 9 composites were found to be slightly more predictive of GRAD/DROP than AR+MK+GS+EI, the corrected validity (.56) of the most predictive composite--MC+MK+EI+WK--was only .05 correlation points higher than that of the operational composite. Although six predictors were found to have slightly higher correlations with DAYS than AR+MK+GS+EI, the corrected validity (.54) of the most predictive composite--MC+MK+EI+WK--was only .06 correlation points higher than that of the operational composite.

Table 4 presents multiple correlations between the three school performance criteria and the most valid sets of five ASVAB tests. As shown, the five-test multiple correlation for predicting GRAD/DROP was .38. A comparison of this correlation with the validities of the selector composites in Table 3 revealed that it was higher than any of the obtained uncorrected validities and .14 correlation points higher than the uncorrected validity of .24 for the operational composite. The multiple correlation between the five ASVAB tests and FSG was .54. This correlation was higher than any of the uncorrected validities and was .07 correlation points higher than the uncorrected validity of .47 for AR+MK+GS+EI. The five-test multiple correlation for predicting DAYS was .35, which was higher than any of the obtained uncorrected validities and .12 correlation points higher than the uncorrected validity of -.23 for AR+MK+GS+EI.

Table 2

Graduation and Drop (Attrition) Rates by ASVAB Version and "A" School Class

Class Number	Forms 5, 6, 7 (N = 198)				Forms 8, 9, 10 (N = 300)				Total (N = 498)			
	Grads		Drops		Grads		Drops		Grads		Drops	
	N	%	N	%	N	%	N	%	N	%	N	%
81-64	8	53.3	7	46.7	0	--	0	--	8	53.3	7	46.7
81-66	6	85.7	1	14.3	6	85.7	1	14.3	12	85.7	2	14.3
81-68	5	55.6	4	44.4	4	66.7	2	33.3	9	60.0	6	40.0
81-72	8	80.0	2	20.0	3	50.0	3	50.0	11	68.8	5	31.2
81-74	6	85.7	1	14.3	3	50.0	3	50.0	9	69.2	4	30.8
81-78	7	87.5	1	12.5	5	71.4	2	28.6	12	80.0	3	20.0
81-80	7	70.0	3	30.0	6	100.0	0	0.0	13	81.2	3	18.8
81-82	0	--	0	--	1	100.0	0	0.0	1	100.0	0	0.0
81-84	2	50.0	2	50.0	7	63.6	4	36.4	9	60.0	6	40.0
81-86	4	80.0	1	10.0	8	88.9	1	11.1	12	85.7	2	14.3
81-90	3	75.0	1	25.0	7	87.5	1	12.5	10	83.3	2	16.7
81-92	0	--	0	--	11	84.6	2	15.4	11	84.6	2	15.4
81-96	1	50.0	1	20.0	11	91.7	1	8.3	12	85.7	2	14.3
81-98	2	100.0	0	0.0	9	69.2	4	30.8	11	73.3	4	26.7
82-02	1	50.0	1	50.0	9	90.0	1	10.0	10	83.3	2	16.7
82-03	1	50.0	1	50.0	9	69.2	4	30.8	10	66.7	5	33.3
82-05	1	66.7	2	33.3	9	75.0	3	25.0	10	66.7	5	33.3
82-06	3	75.0	1	25.0	7	63.6	4	36.4	10	66.7	5	33.3
82-08	6	54.5	5	45.5	8	80.0	2	20.0	14	66.7	7	33.3
82-09	7	70.0	3	30.0	4	36.4	7	63.6	11	52.4	10	47.6
82-11	10	66.7	5	33.3	6	66.7	3	33.3	16	66.7	8	33.3
82-12	10	76.9	3	23.1	5	41.7	7	58.3	15	60.0	10	40.0
82-14	7	58.3	5	41.7	6	50.0	6	50.0	13	54.2	11	45.8
82-15	5	83.3	1	16.7	12	70.6	5	29.4	17	73.9	6	26.1
82-17	7	70.0	3	30.0	6	46.2	7	53.8	13	56.5	10	43.5
82-19	4	57.1	3	42.9	13	72.2	5	27.8	17	68.0	8	32.0
82-20	7	77.8	2	22.2	6	42.9	8	57.1	13	56.5	10	43.5
82-22	3	50.0	3	50.0	9	75.0	3	75.0	12	66.7	6	33.3
82-23	0	0.0	1	100.0	9	81.8	2	18.2	9	75.0	3	25.0
82-25	4	100.0	0	0.0	4	40.0	6	60.0	8	57.1	6	42.9
	135	68.2	63	31.8	203	67.7	97	32.3	338	67.9	160	32.1

Table 3

Validities of ASVAB 5, 6, and 7 Tests and Selector Composites
With Three School Performance Criteria

	Criterion Validities					
	GRAD/DROP (N = 198)		FSG[a] (N = 135)		DAYS[a] (N = 135)	
Predictor	r_u[b]	r_c	r_u	r_c	r_u	r_c
ASVAB Subtest						
GI	05	28	04	45	-02	-28
NO	11	14	09	12	-08	-11
AD	06	02	13	02	10	-05
WK	13	23	03	16	-06	-14
AR	08	38	20*	59	-08	-36
SP	10	28	02	28	-01	-17
MK	22**	46	25**	59	-07	-33
EI	16*	44	30**	73	-26**	-49
MC	27**	48	13	47	-11	-33
GS	05	40	30**	70	-09	-40
SI	11	29	13	43	-14	-32
AI	16*	37	17*	51	-24**	-42
Composites in Use						
WK+AR	15*	42	17*	55	-10	-36
WK+MC+SI	27**	48	15	51	-16	-38
AR+MK+GS+EI	24**	51	47**	77	-23**	-48
NO+AD+WK	14*	17	14	13	-13	-14
AR+MC	24**	49	21*	62	-13	-40
WK+MC	28**	48	11	45	-12	-33
WK+AR+NO+AD	16*	31	19*	38	-14	-28
AR+2MK+GS	21**	49	39**	74	-12	-43
MK+AI	26**	29	34**	69	-27**	-49
WK+MK+GS	21**	48	31**	70	-12	-41
Experimental Composites						
MC+SI+AI	23**	45	19*	56	-21*	-42
AR+SP+EI	18**	46	24**	65	-16	-43
AR+MC+AI+GS	24**	50	31**	70	-22**	-47
AD+EI+MC+SI	26**	51	30**	69	-24**	-48
AD+WK+AR	15*	33	21*	43	-14	-30
MK+EI+SI+AI	24**	49	34**	70	-30**	-51
WK+AR+SP+MC	24**	48	15	56	-10	-36
AD+AR+SP+SI	16*	39	20*	52	-14	-35
GI+AR+MK+EI	23**	50	33**	72	-19*	-46
GI+AI	14*	38	17*	57	-18*	-41
AR+MK+GS	18**	48	40**	75	-13	-44
NO+AD	10	08	14	07	-11	-09
NO+WK	17*	25	09	36	-10	-17
NO+AR	12	35	18*	48	-11	-31
NO+SP	15*	31	08	31	-06	-21
NO+MK	19**	38	19*	43	-10	-27
AD+WK	12	14	14	11	-12	-12
AD+MK	15*	28	22**	33	-12	-12

Note. Decimal points have been omitted. All coefficients are Pearson product-moment correlations. The operational selector composite is MK+GS+EI = 156 + AR = 218.

[a]Because final school grades were not available for studdents who dropped the course, correlations for FSG and DAYS are based on graduates only. FSG criterion M = 83.19, SD = 4.25; Days criterion M = 26.80, SD = 3.14.

[b]r_u = *uncorrected* validity; r_c = corrected validity.

*p = < .05.
**p = < .01.

Table 3 (Continued)

Predictor	Criterion Validities: GRAD/DROP (N = 198) r_u[b]	r_c	FSG[a] (N = 135) r_u	r_c	DAYS[a] (N = 135) r_u	r_c
Experimental Composites (Continued)						
WK+MK	25**	47	18*	51	-09	-32
AR+SP	12	39	12	51	-05	-31
WK+SP	15*	33	04	21	-04	-21
AR+MK	19**	47	29**	67	-10	-39
AR+AI	18**	45	25**	64	-23**	-46
SP+MK	19**	43	13	49	-04	-28
SP+EI	16*	42	17*	57	-14	-39
SP+MC	21**	42	08	43	-06	-28
MK+EI	29**	53	41**	74	-26**	-49
MK+MC	33**	54	24**	62	-13	-39
MK+MC+AI	33**	54	31**	68	-24**	-47
MK+GS	18**	48	38**	74	-11	-42
SI+AI	16*	36	17*	51	-22**	-42
NO+AD+AR	11	25	19*	34	-13	-24
NO+AD+SP	14*	23	14	24	-11	-18
NO+AD+MK	16*	27	20*	29	-12	-20
WK+AR+MC	28**	51	20*	61	-14	-40
WK+AR+SI	19**	45	21*	60	-16	-41
WK+AR+GS	14*	45	30**	70	-13	-42
AR+SP+GS	13	44	24**	67	-08	-39
AR+EI+MC	27**	52	32**	71	-24**	-48
AR+EI+GS	16*	47	41**	76	-22**	-48
AR+MC+SI	24**	49	22**	62	-16	-42
AR+MC+AI	26**	50	25**	65	-22**	-46
AR+GS+AI	16*	46	32**	71	-22**	-47
SP+MK+EI	24**	49	25**	65	-16	-42
SP+MK+MC	26**	49	15	54	-08	-34
MK+EI+MC	34**	55	34**	71	-24**	-48
MK+EI+GS	22**	50	43**	76	-22**	-47
MK+MC+SI	32**	53	25**	63	-17*	-42
EI+SI+AI	17*	42	25**	62	-27**	-48
GI+EI+SI+AI	16*	42	24**	63	-24**	-46
WK+AR+MK	24**	49	26**	65	-12	-40
WK+SP+MK	22**	45	13	48	-06	-30
MC+MK+WK	35**	55	21*	67	-14	-46
WK+GI+SI	14*	36	10	48	-10	-34
MC+MK+EI+WK	35**	56	31**	76	-23**	-54
MC+MK+AR	29**	53	28**	75	-14	-49
AR+SP+MC	21**	46	15	55	-08	-35
AR+SI	14*	42	22**	61	-15	-40

Note. Decimal points have been omitted. All coefficients are Pearson product-moment correlations. The operational selector composite is MK+GS+EI = 156 + AR = 218.

[a]Because final school grades were not available for studdents who dropped the course, correlations for FSG and DAYS are based on graduates only. FSG criterion M = 83.19, SD = 4.25; Days criterion M = 26.80, SD = 3.14.

[b]r_u = uncorrected validity; r_c = corrected validity.

*p = < .05.
**p = < .01.

Table 4

Multiple Correlations Between Five ASVAB 5, 6, and 7 Tests and School Performance Criteria

GRAD/DROP		FSG		DAYS	
Tests	R	Tests	R	Tests	R
MC	.27	EI	.31	EI	.29
MC,MK	.32	EI,MK	.45	EI,NO	.31
MC,MK,AI	.35	EI,MK,AD	.50	EI,NO,AI	.33
MC,MK,AI,WK	.37	EI,MK,AD,GS	.53	EI,NO,AI,MK	.34
MC,MK,AI,WK,NO	.38	EI,MK,AD,GS,AR	.54	EI,NO,AI,MK,SP	.35

ASVAB 8, 9, and 10

Table 5 presents uncorrected and corrected correlations of ASVAB 8, 9, and 10 predictors with GRAD/DROP, FSG, and DAYS. As shown, the operational composite is a better predictor of GRAD/DROP and FSG than any other ASVAB composite; the corrected validities were .65 and .78 respectively. Since the majority of the students who will be entering the school in the near future will have scores on ASVAB 8, 9, or 10 instead of ASVAB 5, 6, or 7, this result suggests that a change from the operational selector composite would probably not reduce attrition. The operational composite was a poor predictor of DAYS, with the corrected validity being -.12. In fact, the corrected validities of most of the ASVAB 8, 9, or 10 predictors were higher than that of AR+MK+GS+EI. The corrected validity of the most predictive composites (CS+AR, CS+MK, NO+CS+AR, and NO+CS+MK) were .10 correlation points higher than the corrected validity of the operational composite.

Table 6 presents multiple correlations between the school performance criteria and the most valid sets of ASVAB 8, 9, and 10 tests. The multiple correlation between the tests and GRAD/DROP was .36. Although this correlation was found to be higher than any of the obtained uncorrected validities, it was only .04 correlation points higher than the uncorrected validity of .32 for AR+MK+GS+EI. The five-test multiple correlation for predicting FSG was .49. While higher than any of the obtained uncorrected validities (see Table 5), this correlation was only .05 correlation points higher than the uncorrected validity of .44 for the operational composite. The multiple correlation between five ASVAB tests and DAYS was .31, which was higher than any of the obtained uncorrected validities and .26 correlation points higher than the uncorrected validity of .05 for the operational selector.

Overall Selector Validation

Validities for the three criteria and across all ASVAB forms were examined. No composites were identified that were more valid than the operational composite for predicting the three criterion measures.

Table 5

Validities of ASVAB 8, 9, and 10 Tests and Selector Composites With Three School Performance Criteria

Predictor	Criterion Validities					
	GRAD/DROP (N = 300)		FSG[a] (N = 203)		DAYS[a] (N = 203)	
	r_u[b]	r_c	r_u	r_c	r_u	r_c
ASVAB Test						
GS	11*	53	23**	68	-02	-11
AR	25**	60	24**	68	-07	-13
WK	17**	49	15*	54	03	-05
PC	11*	38	12	47	06	-02
NO	07	09	00	-05	-12	-11
CS	13*	20	09	11	-20**	-20
AS	07	43	26**	62	-12	-17
MK	19**	57	30**	70	-07	-13
MC	18**	50	33**	64	-16*	-19
EI	20**	57	28**	70	04	-07
VE(WK+PC)	15**	48	13	53	05	-04
Composites in Use						
VE+AR	28**	62	26**	70	-02	-11
VE+MC+AS	17**	54	33**	69	-12	-17
AR+MK+GS+EI	32**	65	44**	78	-05	-12
VE+NO+CS	17**	34	10	25	-18**	-20
VE+MC	21**	55	32**	68	-10	-15
VE+AR+NO+CS	22**	50	15*	48	-17*	-20
AR+MC+AS	23**	59	38**	74	-17*	-19
AR+2MK+GS	26**	62	38**	76	-08	-14
MK+AS	18**	58	31**	66	-14*	-17
VE+MK+GS	23**	61	35**	75	-03	-13
Experimental Composites						
MC+2AS	12*	48	31**	66	-15*	-19
AR+MC+AS+GS	23**	60	40**	76	-15*	-17
AR+EI+MC+AS	25**	61	40**	75	-12	-16
CS+VE+AR	26**	57	22**	61	-16*	-19
MK+EI+2AS	18**	58	38**	75	-10	-15

Note. Decimal points have been omitted. All coefficients are Pearson product-moment correlations. The operational selector composite is MK+GS+EI = 156+AR = 218.

[a]Because final school grades were not available for students who dropped the course, correlations for FSG and DAYS are based on graduates only. FSG criterion M = 82.83, SD = 3.79; Days criterion M = 26.59, SD = 3.03.

[b]r_u = uncorrected validity; r_c = corrected validity.

*p < .05.
**p < .01.

Table 5 (Continued)

Predictor	Criterion Validities					
	GRAD/DROP (N = 300)		FSG[a] (N = 203)		DAYS[a] (N = 203)	
	r_u[b]	r_c	r_u	r_c	r_u	r_c
AR+MK+GS	28**	63	39**	76	-08	-14
NO+CS	12*	17	06	04	-19**	-18
NO+VE	14*	35	07	28	-08	-11
NO+AR	19**	47	12	46	-13	-17
NO+MK	17**	49	18**	54	-14*	-18
CS+VE	19**	42	14*	38	-16*	-19
CS+AR	23**	51	19**	52	-20**	-22
CS+MK	21**	52	24**	59	-20**	-22
VE+MK	23**	60	31**	72	-03	-11
AR+MK	26**	62	33**	73	-08	-14
MK+EI	28**	63	41**	77	-02	-11
MK+MC	24**	60	43**	77	-16*	-18
MK+GS	22**	61	37**	76	-07	-13
NO+CS+AR	19**	42	12	36	-19**	-22
NO+CS+MK	18**	44	17*	44	-20**	-22
VE+AR+MC	30**	63	37**	74	-11	-16
VE+AR+GS	26**	62	31**	73	-03	-11
VE+AR+AS	23**	60	33**	73	-09	-15
AR+EI+MC	30**	64	41**	77	-09	-14
AR+EI+GS	28**	63	38**	76	-02	-11
AR+GS+AS	21**	60	36**	75	-12	-15
MK+EI+MC	28**	63	46**	79	-10	-15
MK+EI+GS	27**	63	42**	78	-03	-11
MK+MC+AS	21**	59	43**	76	-17*	-19
EI+2AS	12*	51	30**	68	-08	-14
MC+MK+AR	30**	63	43**	77	-15*	-17
MC+MK+WK	28**	62	42**	76	-12	-16
MC+MK+EI+WK	30**	64	44**	78	-07	-13
AR+MC	28**	62	38**	74	-16*	-18
AR+AS	21**	58	33**	72	-14*	-17
VE+AR+MK	29**	63	34**	74	-05	-12

Note. Decimal points have been omitted. All coefficients are Pearson product-moment correlations. The operational selector composite is MK+GS+EI = 156+AR = 218.

[a]Because final school grades were not available for students who dropped the course, correlations for FSG and DAYS are based on graduates only. FSG criterion M = 82.83, SD = 3.79; Days criterion M = 26.59, SD = 3.03.

[b]r_u = uncorrected validity; r_c = corrected validity.

*p < .05.
**p < .01.

Table 6

Multiple Correlations Between Five ASVAB 8, 9, and 10 Tests and School Performance Criteria

GRAD/DROP Tests	R	FSG Tests	R	DAYS Tests	R
AR	.25	MC	.33	CS	.20
AR,EI	.31	MC,MK	.43	CS,MC	.26
AR,EI,WK	.33	MC,MK,EI	.47	CS,MC,EI	.28
AR,EI,WK,CS	.35	MC,MK,EI,CS	.48	CS,MC,EI,AS	.29
AR,EI,WK,CS,MK	.36	MC,MK,EI,CS,GS	.49	CS,MC,EI,AS,PC	.31

Expectancy Analyses

Table 7 presents expectancy tables constructed for AR+MK+GS+EI for both ASVAB versions. Data are presented for the current cutting scores, as well as for a variety of alternates. It is evident from the table that the cutting score used with the operational composite would have to be raised dramatically to lower attrition to acceptable (0-20%) levels. For example, to obtain an attrition rate of 10 percent using the operational ASVAB 8, 9, and 10 composite, a cutting score of 245 would be needed instead of the current 218. If such a selection criterion were used, only 11 percent of the recruit population would be eligible for assignment to SWSE "A" school, as opposed to the 40 percent who are currently eligible. To reduce the attrition rate to 21 percent, a cutting score of 233 would be required. This cutting score would allow 22 percent of the recruit population to qualify for the school. Very similar expectancy analysis results were obtained for the operational ASVAB 5, 6, and 7 composite.

Supplementary Analyses

Table 8 presents uncorrected and corrected correlations between scores on the six class-administered achievement tests and the three school performance criteria for the two ASVAB samples. For the ASVAB 5, 6, and 7 sample, MATHTEST and SWSMATH1 appeared to be the most valid of all the achievement tests. SWSMATH1 had a corrected validity of .50 for predicting graduation; MATHTEST had corrected validities of .59 for predicting FSG and -.36 for predicting DAYS. None of the achievement tests was found to be as valid as the operational composite.

For the ASVAB 8, 9, and 10 sample, MATHTEST, SWSMATH1, and SWSMATH2 predicted school performance best of all of the achievement tests. As shown in Table 8, SWSMATH1 had a corrected correlation of .61 with GRAD/DROP, MATHTEST had a corrected correlation of .65 with FSG, and SWSMATH2 had a corrected correlation of -.34 with DAYS. While none of the achievement tests predicted GRAD/DROP and FSG as effectively as the operational composite, all six of the tests predicted DAYS better.

After ASVAB tests and selector composites were correlated with scores on the six achievement tests, the resulting correlations were computed and corrected for range restriction to determine whether the achievement test scores could be largely predicted

Table 7

Expectancy Analysis of ASVAB Selector Composite AR+MK+GS+EI

Cutting Score	GRAD N	GRAD %	DROP N	DROP %	Total N	% At or Above Cut Score in Recruit Population	Expectancies per 1000 in Recruit Population GRAD	DROP	Total
ASVAB Forms 5, 6, and 7 (N = 198)									
>260	3	100	0	0	3	4	40	0	40
>257	5	100	0	0	0	5	50	0	50
>254	10	91	1	9	11	7	64	6	70
>251	17	94	1	6	18	8	75	5	80
>248	23	88	3	12	26	10	88	12	100
>245	30	83	6	17	36	12	100	20	120
>242	41	84	8	16	49	15	126	24	150
>239	55	81	13	19	68	18	146	34	180
>236	68	83	14	17	82	20	166	34	200
>233	75	78	21	22	96	24	187	53	240
>230	91	76	28	24	119	27	205	65	270
>227	104	73	38	27	142	31	226	84	310
>224	111	72	44	28	155	35	252	98	350
>221	126	70	55	30	181	39	273	117	390
>218[a]	133	68	63	32	196	44	299	141	440
>215	135	68	63	32	198	48	326	154	480
ASVAB Forms 8, 9, and 10 (N = 298)									
>260	12	92	1	8	13	3	28	2	30
>257	23	88	3	12	26	4	35	5	40
>254	29	85	5	15	34	6	51	9	60
>251	43	86	7	14	50	7	60	10	70
>248	58	89	7	11	65	9	80	10	90
>245	75	90	8	10	83	11	99	11	110
>242	89	87	13	13	102	14	122	18	140
>239	107	84	21	16	128	16	134	26	160
>236	121	80	30	20	151	19	152	38	190
>233	137	79	37	21	174	22	174	46	220
>230	149	75	50	25	199	25	188	62	250
>227	169	74	58	26	227	28	207	73	280
>224	177	71	71	29	248	32	227	93	320
>221	195	70	83	30	278	36	253	107	360
>218[a]	202	68	95	32	297	40	272	128	400
>215	202	68	96	32	298	44	298	142	440

[a]Cutting score in current use.

Table 8

Validities of Six Class-administered Achievement Tests for Predicting School Performance Criteria

Achievement Test	Criterion Validities					
	GRAD/DROP		FSG		DAYS	
	r_u	r_c	r_u	r_c	r_u	r_c
ASVAB 5, 6, and 7						
MATHTEST	27**	48	26**	59	-12	-36
SWSMATH1	34**	50	30**	48	-01	-17
SWSMATH2	36**	45	33**	38	-01	-09
VOCABLEV	02	20	-02	31	-01	-20
COMPLEV	16*	35	05	39	-05	-19
READLEV	10	30	01	39	-03	-22
ASVAB 8, 9, and 10						
MATHTEST	24**	57	26**	65	-17*	-20
SWSMATH1	31**	61	23**	44	-16*	-20
SWSMATH2	26**	58	39**	50	-32**	-34
VOCABLEV	17**	54	21**	57	-05	-11
COMPLEV	19**	55	10	46	-12	-16
READLEV	23**	57	14*	53	-11	-15

Note. Decimal points have been omitted. r_u = uncorrected validity; r_c = corrected validity.

*p < .05.
**p < .01.

from ASVAB scores. For each of the six achievement tests, the ASVAB test or composite found to have the highest (corrected) correlation with the achievement test was identified (see Table 9). The means of these corrected correlations were .62 and .70 for ASVAB forms 5, 6, and 7 and 8, 9, and 10 respectively. While this result indicates a fairly strong relationship between the selected ASVAB predictors and the achievement tests, the relationship does not appear sufficiently strong to warrant substitution of the ASVAB predictors for the achievement tests.

Table 9

Correlations of ASVAB Tests and Composites With Scores on Six Class-administered Achievement Tests

Achievement Test[a] and ASVAB Test	Validities	
	r_u	r_c
ASVAB 5, 6, and 7		
MATHTEST with MK	54*	75*
SWSMATH1 with AR+MK	44*	64*
SWSMATH2 with MK	37*	47*
VOCABLEV with WK	64*	67*
COMPLEV with WK	49*	54*
READLEV with WK	62*	64*
ASVAB 8, 9, and 10		
MATHTEST with AR+MK	64*	86*
SWSMATH1 with AR+MK	38*	59*
SWSMATH2 with MK	35*	54*
VOCABLEV with WK	53*	73*
COMPLEV with WK	51*	70*
READLEV with WK	59*	76*

Note. Decimal points have been omitted from validities. r_u = uncorrected validity; r_c = corrected validity.

[a]For each achievement test, the ASVAB subtest or composite shown in the table is the one that was found to have the highest correlation with the achievement test.

*$p < .01$.

CONCLUSIONS

1. The current ASVAB selector composite for SWSE "A" school (AR+MK+GS+EI) would be the most useful for selecting students.

2. Overall, the results of the validation and expectancy analyses indicate that the best way to lower attrition at SWSE "A" school would be to retain the current selector composite, while raising the cutting scores. However, this method would reduce the number of eligible recruits, making the school quota more difficult to fill. The costs and benefits associated with each of the various cutting scores should be carefully considered before a decision is reached to change or to retain the current cutting scores.

RECOMMENDATION

The operational selector composite should be retained by SWSE "A" school, but careful consideration should be given to raising composite cutting scores.

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